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DEPT. INSECTS

DEPARTMENT OF AGRICULTURE,
NEW SOUTH WALES.

SCIENCE BULLETIN, No. 19.

October, 1921.

A DESCRIPTIVE CATALOGUE OF THE SCALE INSECTS ("COCCIDAE") OF AUSTRALIA.

PART III.

W. W. FROGGATT, F.L.S.,
Government Entomologist.

Workers in the respective branches of Economic Science covered by this series of Science Bulletins will receive such of them as may be of use in their special branches of study upon application to the Under Secretary and Director, Department of Agriculture, Sydney.

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A Descriptive Catalogue of the Scale Insects ("Coccidæ") of Australia.

PART III.

SUB-FAMILY V.—*Idiococcinae*, Maskell.

When defining this group (1892) Maskell says: "Adult females active or stationary, gall making or naked, or producing cotton or wax. Anal tubercles entirely absent; anal ring hairless. Antennæ with usually less than seven joints. Body not prolonged posteriorly." In 1898, he redefined the group: "Anal tubercles absent or rudimentary; anal ring with or without hairs."

When erecting this sub-family, Maskell said, "they are separated from the *Monophlebinae* by the absence of anal tubercles, and by the antennæ; from the *Brachysceliuae* by the absence of any abdominal prolongation or 'tail': from the *Anthococcinae* and *Dactylopiinae* by the absence of anal tubercles and the hairless anogenital ring. They come nearer the *Coccinae* in which the anogenital ring is hairless."

The male coccids develop in the cavity of the female galls in most cases, and do not form separate galls.

In Mrs. Fernald's catalogue this group is merged into the sub-family *Dactylopiinæ*, but if there is any valid reason for subdividing the *Coccinae*, this one is very well defined and should stand, certainly as regards the Australian gall-making species.

Genus XLVIII. *Sphaerococopsis*, Cockerel.

Proc. Acad. of Nat. Sciences, Philadelphia, p. 262, 1899.

Canadian Entomologist, vol. xxxi, p. 277, 1899.

This genus was created to give generic rank to a remarkable coccid described by Maskell under the name of *Sphaerococcus inflatipes*, which has three pair of well-defined legs in the adult female. He defines it: "Adult female with all the legs present; the first four small, hind pair very large, margins with spines; anal ring without hairs."

Sphaerococopsis inflatipes, Maskell (Fig. 1).

Sphaerococcus inflatipes, *Trans. N. Zealand Institute*, vol. xxv, p. 238, pl. xvii, figs. 1–5, 1892.

Sphaerococopsis inflatipes, Cockerell, *Pro. Acad. Nat. Sci. Phil.*, p. 262, 1899.

The type specimens came from Myrniong, Victoria, upon an undetermined species of eucalypt; on the stems of the peppermint gum (*Eucalyptus novae-angliae*), Uralla, and *E. botryoides*, Kurnell, New South Wales.

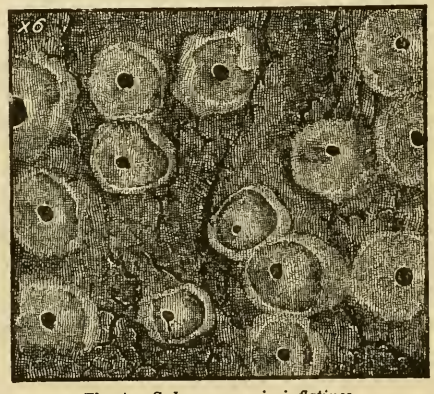

Fig. 1.—*Sphaerococopsis inflatipes.*

The adult female produces a central pit beneath the surface of the bark of the trunk, or main branches, round which rises a ring of swollen tissues, which forms a circular blister with a depression at the apex, in the centre of which is the apical orifice. Under the opening, resting upon the centre of the back of the enclosed coccid, is a convex semi-transparent membrane, like a conical cap (probably the last larval moult). Diameter of blister gall, about one-eighth of an inch.

Adult female dark yellowish brown; about one-tenth of an inch in diameter; circular in form, with legs and antennæ projecting when mounted in potash. Antennæ stout: terminal joint rounded, surmounted with fine hairs. Maskell says six-jointed, live specimens show only five, but there may be a sixth; three pairs of legs, the first two pairs small, hind pair large, thickened; tibiae long, swollen to the tips; tarsus cylindrical, first joint long, second short, with no true tarsal claw, but bearing two slightly thickened digitules. Anal ring distinct, showing no hairs. Hind margin of dorsal surface fringed with dark brown spines, the central eight in contact at the base, the dorsal surface clothed with scattered dark spines and fine hairs, thickest on the anterior portion; the whole surface granulated with irregular oval tesselations, not in contact with each other. Live specimens, when extracted from the galls, look very much like minute crabs, the short stout antennæ standing out on either side of the head, with the hind margin of the abdominal segments turned upward, and the swollen hind legs projecting on the sides.

Specimens examined from Kurnell showed that the female produces some white meal or filaments. The anal spines were not so well defined in the anal comb; structure more open at the base, but comprising about twenty instead of eight, while the hairs fringing the outer margins of the coccid are very fine and soft.

Genus XLIX. *Pseudopsylla*, n.g.

The female coccids produce solid woody galls on the branchlets of eucalypts with an irregular opening on the upper surface.

Adult female coccid pea-shaped, circular, with two pair of stout legs; antennæ composed of six segments, third very long, sixth very small, anal tubercles wanting; anal ring without hairs; legs and body clothed with fine hairs or spines. These galls, in which the females rest, are very like those produced by *Trozia solida* (a Psyllid), which cannot emerge until the apical surface of the gall splits.

Pseudopsylla hirsutus, n.sp. (Fig. 2).

This curious gall-making coccid comes form Darwin, Northern Territory, where Mr. G. F. Hill collected it upon an undetermined species of eucalyptus. Irregular, rounded, basket-shaped galls, sessile, walls thick, with apical opening large and very irregular.

Fig. 2.—*Pseudopsylla hirsutus.*

Adult female coccid deep red; legs and antennæ brownish yellow: tarsi and claws lighter coloured than the tibiæ; with floury secretion and floceulent matter in the gall chamber. Diameter, one-sixth of an inch. Convex above, concave beneath, but swelling out into a rounded form, with distinct segmental divisions. Antennæ long, slender, first joint short, broad, second cylindrical, about as long as the first, third about four times the length of the second, fourth not more than half the length, fifth short, sixth very short and small. A dark area like a circular spiracle in front of the base of each antennæ. Legs stout, tibiæ and tarsi fringed on the inner edge, with short black spines, margin with a few fine hairs; tarsal claws short, sharply curved inwards, digitules long, slender hairs. Dorsal surface thickly covered with short spines; circular orifices, and short blunt rods, densest on the abdominal segments. The anal ring without hairs; anal tubercles wanting, and the anal segment rounded. Immature female with three pair of legs, all similar in form, but the middle pair lighter coloured than the others.

Genus L. *Sphaerococcus*, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 237, 1892.

Cockerell, *Canadian Entomologist*, vol. xxxi, p. 227, 1899.

This genus was created by Maskell in a paper published in 1891, but he did not define it until the following year, where he says: "Adult females naked or producing cotton, or wax: anal tubercles absent; anogenital ring hairless. Antennæ of usually less than seven joints, sometimes atrophied. Feet sometimes absent, sometimes atrophied, sometimes deformed. Adult male unknown."

Cockerell, in his "Tables for the determination of the Genera of Coccidae," in removing *S. inflatipes* into a new genus, reduces them to a well-defined group of legless coccids, into which all the Australian species will fit. Cockerell's definition is: "Adult female with the antennæ minute, conical; legs entirely absent; skin with many circular glands."

Sphaerococcus acaciae, Maskell.

Trans. N. Zealand Institute, vol. xxv, p. 237, pl. xvi, figs. 6–11, 1892.

This species was found upon the branchlets of an undetermined species of *Acacia* growing at Queanbeyan, New South Wales; it has not been recorded since the type was collected.

The adult females globular, dark brown, each enclosed in a rounded mass of white cottony secretion, often aggregated in masses. Antennæ and legs absent; anogenital ring very small and difficult to detect; simple, without hairs, anal tubercles wanting. Epidermis bearing numbers of minute tubular spinnerets, and on the median dorsal surface many small clear oval markings. Spiracles large. Diameter of female, one-ninth of an inch.

Maskell gives a description of the larvæ as flattened brownish creatures with thickened legs and antennæ, with the usual terminal setæ. He says: "This insect is allied to *S. casuarinae*, but differs quite sufficiently for specific separation."

364. *Sphaerococcus acaciae*. Cat. Coccidæ, p. 85.

Sphaerococcus cantentulatus, n.sp. (Fig. 3).

These coccids attack the young branchlets of the weeping myall (*Acacia pendula*), growing in the Condobolin district, New South Wales, causing them to swell out into gouty excrescences, irregularly rounded, up to an inch in length and one-eighth of an inch in diameter. These thickened twigs are hollow, containing a row of gall chambers, each separated from

Fig. 3.—*Sphaerococcus cantentulatus*, n.sp.

the other. The adult female rests in the centre, upon an oval depression or scar, through which there is sometimes an aperture; the outer surface of the gall mass marked with tubercles corresponding with the depressions inside the gall chambers.

Adult female reddish brown, semi globular, wrinkled, with the abdominal segments reduced to a point at the apex; legs and antennæ aborted.

Sphaerococcus casuarinae, Maskell.

Trans. N. Zealand Institute, vol. xxiv, p. 39, pl. viii, f. 8–20, 1891.

The type specimens were described from Victoria, where they were found upon the basal portion of the galls of *Cylindrococcus casuarinae*, formed upon the branchlets of *Casuarinae quadrivulvis*. I have found them in the same situation on casuarinas growing on the cliffs at Newport, New South Wales.

Adult female resting upon a felted cotton pad on the bract of the host gall; dark reddish brown; naked when exposed, but under the cover of the bracts often more or less covered with white cotton; broadly oval, very convex (Maskell says "globular," but in a series of fresh specimens they are more oval). Diameter, about one-sixteenth of an inch.

Antennæ very small, composed of four or five indistinct joints, conical,) with a few hairs at the tips. Legs wanting. Epidermis covered with numerous multilocular spinnerets, which are smaller and more scattered on the anterior region, interspersed with very minute short slender spiny hairs. Anogenital ring simple without hairs.

365. *Sphaerococcus casuarinae*. Cat. Coccidæ, p. 85.

Sphaerococcus elevans, Maskell.

Trans. New Zealand Institute, vol. xxvii, p. 68, pl. vii, f. 5–8, 1894.

The coccids were found on the stems of the malle gum (*Eucalyptus dumosa*) at Mildura, Victoria. They burrow under the surface bark, and form circular convex blisters about one-eighth to one quarter of an inch in diameter; the portion of the cavity smooth, the bottom covered with white secretion.

Adult female yellow, circular, resting in the centre of the cavity; dorsal surface very variable in form, usually flattened, with a central brownish boss. Diameter about one twenty-fourth of an inch. Antennæ almost obsolete. Legs wanting; no anal tubercules, and the anogenital ring simple, without hairs. Epidermis showing no spinneret orifices.

367. *Sphaerococcus elevans*. Cat. Coccidæ, p. 86.

Sphaerococcus ethelae, Fullar.

Journal West Australian Bureau Agriculture, vol. iv, p. 1346, 1897.
Trans. Ent. Soc. London, p. 462, pl. xv, f. 20. 1899.

This coccid is found upon the twigs of an undetermined species of Casuarina growing on the Swan River, Western Australia. The adult female coccids congregate together, forming a regular sear in the bark, and are enveloped in a white woolly secretion: they somewhat resemble a colony of woolly aphis on an apple tree.

Adult female green, globular, covered with scales of white wax. The epidermis covered with spinnerets, and slightly protruding pores. Antennæ wanting, represented by small chitenous spots. Legs wanting. Cast skin of larval stage often covering the adult.

368. *Sphaerococcus ethelae*. Cat. Coccidæ, p. 86.

Sphaerococcus ferrugineus, Froggatt (Fig. 4).

Pro. Linn. Soc. N.S.W., vol. xxiii, p. 378, pl. ix, f. 16–20, 1890.

Forming reddish brown to dull green rounded fluffy excrescences, composed of many fine filaments or bracts radiating from the basal gall, on the side or tip of the branchlet of several species of *Melaleuca*, growing along the coast of northern New South Wales and southern Queensland.

Fig. 4.—*Sphaerococcus ferrugineus.*

The adult dark reddish-brown female is marked with dull yellow on the dorsal surface, and is embedded in the central woody cavity. Diameter, about $1\frac{1}{4}$ lines. General form oval, dorsal surface conical, antennæ indistinct, legs wanting.

369. *Sphaerococcus ferrugineus.* Cat. Coccidæ, p. 86.

Sphaerococcus froggatti, Maskell (Fig. 5).

Trans. New Zealand Institute, vol. xxvi, p. 94, pl. vii, f. 1–7, 1893.

This coccid is very common upon the titree (*Melaleuca linarifolia*), growing in the vicinity of Sydney.

Fig. 5.—*Sphaerococcus froggatti.*

The female coccids form brown or reddish yellow galls, attached at the base to the twigs, cup-shaped in form, but covered with curling cylindrical processes, often much longer than the basal gall, so that the whole gall is enveloped in a feathery mass of these filaments, though they spring from the upper surface. Galls variable in size, from one-fifth to half an inch in diameter.

The adult female develops on the gall cavity, dull red in colour; she is dusted with white meal, and has a bluish grey tint; general form subglobular, tapering to the anal extremity. Length about one-twelfth of an inch. Antennæ aborted, indistinct; appear to consist of two joints. Legs wanting. There are four large spiracles. The epidermis bearing a number of circular multilocular spinnerets, and a few fine spiny hairs, thickest on the abdominal region. Anal tubercules wanting, anal ring without hairs.

370. *Sphaerococcus froggatti.* Cat. Coccidæ, p. 86.

Sphaerococcus leaii, Fuller (Fig. 6).

Journal West Australian Bureau Agriculture, vol. iv, p. 1346, 1897.
Trans. Ent. Soc. London, p. 448, pl. xv, f. 21, 1899.

The female coccids produce very curious subspherical galls, with deeply fluted sides, upon the branchlets of an undetermined species of *Casuarina*, at Perth, West Australia.

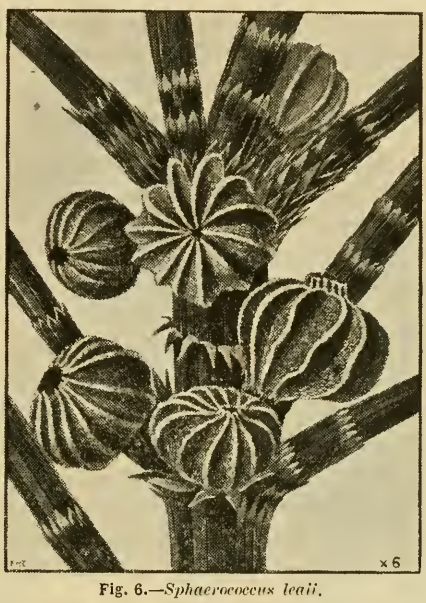

Fig. 6.—*Sphaerococcus leaii*.

These galls are greyish brown, and appear to be composed of a number of distinct sections, but are solid and united on the inner surface of the basal cavity, with the opening at the apex. Height, about half an inch. Usually found in little clusters of four or five, they might be easily mistaken for aborted seed cones of the sheoak, upon which they are developed.

Adult female pink, general form globular, filling the gall chamber, showing slight segmentation; no anal tubercules. Dorsum bearing yellow spines.

371. *Sphaerococcus leaii*. Cat. Coccidæ, p. 371.

Sphaerococcus leptospermi, Maskell (Fig. 8).

Trans. New Zealand Institute, vol. xxvi, p. 92, f. 4–14, 1893.

This species form galls upon the branchlets of the coastal leptosperm (*Leptospermum laevigatum*), common about the coast at Botany, N.S.W.

The galls are produced like a swollen elongated blister or raised excrescence in the surface of the branchlet, the wood and bark swelling up on either side of the buried coccid, which rests in the cleft between, which forms a

narrow slit along the back of the coccid. The gall cavity is smooth above, with the bottom covered with white meal, upon which the coccid rests Length of gall from $\frac{1}{3}$ of an inch, and the thickness from $\frac{1}{4}$ to $\frac{1}{2}$ inch.

Adult female fitting closely into the gall chamber, varying in colour from olive green to brown or black, lightly covered with floury secretion. Length, quarter of an inch. General form elliptical, about a quarter of an inch in length. Antennæ obsolete, only represented by minute tubercles; legs wanting. Four principal spiracles large; epidermis covered with circular spinneret orifices, thickest and largest on the dorsal surface. Anal ring small, hairless; anal tubercules obsolete.

372. *Sphaerococcus leptospermi.* Cat. Coccidæ, p. 86.

Sphaerococcus melaleucae, Maskell.

Trans. New Zealand Institute, vol. xxvi, p. 94, pl. vi, f. 15–20, 1893.
Sphaerococcus acacia var. *melaleuca*, Cockerell.

These insects are not uncommon on the twigs of the titree (*Melaleuca liniariifolia*), growing at Penshurst, Flemington, and similar localities in the vicinity of Sydney.

The adult females form no galls, but cover themselves with small masses of roughened black waxy secretion, from which project smaller conical processes of unequal length. Diameter of test, one-tenth of an inch.

Adult female dull reddish pink; general form convex, elliptical, tapering to the apex. Diameter, one-twentieth of an inch. The cephalic and thoracic segments smooth, the abdominal ones smaller, tapering, and closely marked with convoluted corrugations. Antennæ composed of five very short joints, the last somewhat globular, with several long hairs. Legs wanting. Thoracic spiracles rather large and close to each a group of circular spinneret-orifices. Epidermis bearing some circular spinnerets. Anal ring without hairs, anal tubercles absent, with no terminal setæ or hairs.

Sphaerococcus melaleuca. Cat. Coccidæ, p. 85.

Sphaerococcus morrisoni, Fuller (Fig. 7).

Journal West Australian Bureau Agriculture, vol. iv, p. 1346, 1897.
Trans. Ent. Soc. London, p. 450, pl. xv, f. 22, 1899.

Fig. 7.—*Sphaerococcus morrisoni.*

This species comes from Pinjarrah, West Australia, where it forms galls on the tips of the branchlets of a ti-tree (*Melaleuca*, sp.).

Galls broadly oval, often in bunches of five or six, greyish brown, with the surface roughened with little bracts, constricted in the centre and rounded to the apex, with a slight rim round the small apical orifice. The interior of the gall is divided into an upper and lower chamber. Length, three-quarters of an inch; diameter, half an inch.

Fig. 8.—1. *Brachyscelis duplex*, Schr. 2. *Sphærococcus leptospermi*, Mask. 3. *Cylindrococcus spiniferous*, Mask.

The adult female rests in the bottom of the lower chamber, with the tip of her abdomen turned upwards.

373. *Sphaerococcus morrisoni.* Cat. Coccidæ, p. 86.

Sphaerococcus newmanni, n.sp.

The coccids, forming curious rounded tests of secretion upon the twigs of a titree (*Melaleuca* sp.), were collected by Mr. L. J. Newman, at Busseltown, West Australia.

Female puparium formed of a thin skin of light biscuit to yellowish brown waxy secretion, which dissolves readily in caustic potash. The base is attached to the surface of the bark, swelling out on the sides, and broadly rounded to the summit; it appears to be formed of three sections coalescing along the impressed lines, one of which divides the centre and the other circles round the apical orifice, which spins out in a little boss in the centre. Length of puparium, one-eighth of an inch.

Fig. 9.—*Sphaerococcus newmanni*, ns.p.

Adult female dark reddish brown, much wrinkled, oval, and when treated with ptoash giving off a rich red tint; length, about one-tenth of an inch; she rests in the puparium with the anal segment curving round to the apical orifice; the cephalic portion resting upon woolly filaments, which protect the larvæ. Antennæ and legs wanting; rostrum distinct, with a curious dark yellowish brown band extending to the anal segment, before reaching which it forms a lance-headed patch, and then a transverse band, producing a cross-like pattern, with an opaque granulated structure on the anal segment.

Larvæ bright red, almost cylindrical, elongated; legs long, well developed; antennæ composed of four joints, the third the longest, clothed with fine bristles that extend over the terminal joint.

Sphaerococcus obscuratus, Maskell.

Trans. New Zealand Institute, vol. xxviii, p. 403, pl. xxii, f. 10–17, 1895.

The type specimens were found upon the bark of two different wattles (*Acacia linifolia* and *A. obtusiflora*), growing at Hornsby, N.S.W.

The adult females produce depressions or blisters in the bark in which they rest, often enclosed in the larval skins. The bark, in consequence of their presence, is often so thickly covered with fumagine fungus that the coccids are hidden from view.

Adult female dull red to brownish yellow: globular. Diameter about one twenty-eighth of an inch: antennæ very variable, sometimes almost obsolete, in others showing six or three very indistinct joints. Legs absent. There are four large thoracic spiracles, each surrounded with a ring of circular glands. Epidermis with many small circular spinnerets, with large ones on the abdominal segments; anal ring without hairs. On the dorsal surface of abdomen are chitenous bands, on the upper segments short spines.

374. *Sphærococcus obscuratus*. Cat. Coccidæ, p. 86.

Sphaerococcus pirogallis, Maskell (Fig. 10).

Trans. New Zealand Institute, vol. xxvi, p. 95, pl. vii, f. 8–19, 1893.

Froggatt, *Agric. Gazette, N.S.W.*, vol. ix, p. 18, 1898.

The remarkable galls formed by this coccid often cover the foliage of acres of *Leptospermum flavescens*, growing in the vicinity of Sydney and on the Blue Mountains. These galls in course of development vary from green, pink, red to light brown when mature, and average up to one-quarter of an inch in height. The general form is pear-shaped, with the summit slightly flattened; the basal stalk is thickened with a small slit-like opening on the side, giving entrance into the thin hollow gall above. At the top or roof of the gall is a circular, saucer-like structure, in which, surrounded with white mealy secretion, rests the adult female coccid. The male coccids and larvæ may be found in the gall chamber with the female. Adult female red, subcircular, slightly concave beneath and convex above. Diameter, one thirty-fifth of an inch. Antennæ very obscure, apparently composed of five or six joints, without any hairs or bristles. Legs wanting. Anal ring simple, hairless. Four large thoracic spiracles, with the epidermis bearing circular multiocular spinnerets with many long spiny hairs which, near the tip of the abdomen, are arranged in a regular ring.

Maskell has written an exhaustive account of this species, covering four pages of the "Transactions": he considers it one of the most remarkable gall-making coccid he had ever examined.

375. *Sphaerococcus pirogallis*. Cat. Coccidæ, p. 87.

Fig. 10.—*Sphaerococcus pirogallis.*

Sphaerococcus pulchellus, Maskell (Fig. 11).

Trans. N.Z. Institute, vol. xxix, p,. 343, pl. xxi, f. 10–13, 1897.
Fuller, *Trans. Ent. Soc. London*, p. 448, 1899.

This coccid forms a curious test, somewhat like that of an adult female *Eriococcus*, upon the branchlets of an undetermined *Melaleuca* growing in swampy localities. Fuller records his specimens upon the twigs of *Hypocalymma angustifolia*, in West Australia. Tests pale biscuit brown, formed of a waxy secretion deeply fluted on the apical section, which is cleft and surrounded with an impressed line; the basal portion below smooth, the whole looking as if composed of two distinct parts. Length, one-seventh to one-twelfth of an inch.

Fig. 11.—*Sphaerococcus pulchellus.*

The enclosed female black, subglobular, filling the test; antennæ and legs aborted; dorsal surface covered with many small tubular spinnerets.

377. *Sphaerococcus pulchellus.* Cat. Coccidæ, p. 87.

Sphaerococcus rugosus, Maskell.

Trans. N.Z. Institute, vol. xxix, p. 322, pl. xxi, f. 5–7, 1897.

These coccids produce remarkable dark green subglobular galls, stalked at the base, swelling out on the sides with the apex cone-shaped. The whole surface of the gall is wrinkled, with no visible opening at the apex. They are found upon the leaves, and sometimes on the twigs of an undetermined species of *Leptospermum*, Mount Barker, West Australia. Diameter about one-sixth of an inch.

Maskell also describes a sessile form on the leaves of an undertermined tree, under the varietal name of *elongatus*, which he also figures. These came from Albany, West Australia.

Adult female dark red, form globular, fitting closely to the interior and covered with white meal; antennæ and legs wanting; spiracles dilated at both extremities; small circular spinnerets, and short hairs on the abdominal segments.

378. *Sphaerococcus rugosus.* Cat. Coccidæ.

Sphaerococcus styphcliae, Maskell (Fig. 12).

Trans. N.Z. Institute, vol. xxvii, p. 67, pl. vii, f. 1–4, 1894.

This species was collected on the twigs of *Styphelia* (*Monotica*) *elliptica*, growing at Rose Bay, near Sydney.

Fig. 12. –*Sphaerococcus styphcliae.*

The adult females are enveloped in a semiglobular roughened mass of yellowish waxy secretion, slightly tinted with pink, and often blackened with fumagine. Diameter, about one-twentieth of an inch.

Adult female convex, with the ventral surface flattened, filling the whole test: general colour dark brown or purple. Antennæ aborted, but while the feet are wanting, they are replaced by six swollen short tubular processes like the lac tubes of *Tachardia*. Epidermis covered with numbers of circular spinneret orifices.

380. *Sphaerococcus styphcliae.* Cat. Coccidæ, p. 87.

Sphaerococcus socilis, Maskell.

Trans. N.Z. Institute, vol. xxix, p. 325, pl. xxii, f. 1–7, 1897.

These coccids produce globular galls of imbricated scales (like little pine cones) of a greyish green colour, varying in size from a pin's head to half an inch in diameter. They grow upon the twigs of an undetermined species of *Melaleuca* at Geraldton, West Australia.

Each gall when cut across shows a central cell with smaller galls surrounding it, so that it is really an outer shell covering a group of smaller galls, each containing a number of coccids in all stages of development.

The adult female is dark red, globular, with very small antennæ tipped with fine hairs, legs aborted, with the epidermis bearing large tubelar spiracles.

379. *Sphaerococcus socilis.* Cat. Coccidæ, p. 87.

Sphaerococcus tepperi, Fuller.

Journal of Bureau Agriculture, West Australia, p. 1346, 1897.

Trans. Ent. Soc. London, p. 449, pl. xv, f. 16, 1899.

A species described by Fuller, which appears to be closely allied to *S. socilis*, coming from the same locality, and on a similar food plant. The differences, given by the author, are that the adult female coccid is smaller, differs in colour, and possesses a pair of aborted hind legs. The gall is apparently very like that of Maskell's species.

382. *Sphaerococcus tepperi.* Cat. Coccidæ, p. 87.

Sphaerococcus turbinata, n.sp.

These galls were received from Mr. A. M. Lea, collected near Launceston, Tasmania, upon the twigs of an undetermined species of *Melaleuca*.

They are light brown, smooth, turbinate galls, spotted with tiny black dots, slightly over half an inch in height, and three-eighths of an inch in diameter. The basal portion forms a short stout stalk or peg, broadly rounded to the apex, which forms a conical point. They have a large basal orifice on the side of the stalk, opening into a large chamber, the internal structure resembling that of *Sphaerococcus pyrogallis*, Mask. These galls, usually formed in clusters of three or four on the small twigs, might easily be mistaken by the casual observer for seed capsules.

The adult female coccids had been so badly damaged by hymenopterous parasites as to render their description impossible.

Genus LI. *Cylindrococcus*, Maskell.

Trans. New Zealand Institute, vol. xxiv, p. 41, 1891.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 277, 1899.
Crocidocysta, Rübsaamen, *Berl. Ent. Zeit.*, Bd. xxxix, p. 218, 1894.

This genus was founded by Maskell for a remarkable group of coccids that form curious seed capsule-like galls upon the twigs of the *Casuarinas* (sheoaks), and the species are widely distributed over Australia.

Gall-producing coccids, with only the anterior pair of legs present, the anal segment circular, slightly convex, and not prolonged into a tail, but bearing long fine hairs, while the cephalic and thoracic segments are almost hairless.

Cylindrococcus amplior, Maskell (Fig. 13).

Trans. New Zealand Institute, vol. xxiv, p. 44, pl. x, figs. 8, 1891; vol. xxv, p. 240,1892.
Cockerell, *Canadian Entomologist*, vol. xxxi, p. 277, 1899.
Crocidocysta froggati, Rübs., *Berl. Ent. Zeit*, B. xxxix, p. 219.

In 1891, Maskell described the galls without giving the maker a specific name; in the following year he completed his description from specimens

Fig. 13.—*Cylindrococcus amplior.*

from Adelaide, South Australia, on *Casuarina quadrivalvis;* it has also been collected on casuarinas in south-western Victoria (C. French, junior).

The galls springing out from the branchlet usually solitary, but sometimes in clusters of two or three, oval tapering to the tip, sessile and wonderfully like a seed cone. The basal portion of the gall composed of a number of reddish brown leaf-like bracts which encircle the base well up the sides, forming a calyx-like structure, into which fits the gall proper. This is broad at the base, oval, and tapering to a pointed apex, which is formed of the tips

of the five parallel sections coalesced together, which compose the gall; these tips, being bract-like, and covering the apical orifice. The whole of the outer surface of the gall thickly clothed with a uniform coat of greyish down, hiding the sectional structure, except at the apex. Variable in size, up to one inch in height, and five-eighths of an inch in diameter in the centre. The internal structure is solid, with a central hard smooth-walled circular chamber running from the base to the apex.

The adult female reddish, elongate, cylindrical, truncate at the head, with the tip of the abdomen rounded, clothed with fine hairs; viewed from the dorsal surface it shows several segments, of which the first three are largest, with rounded posterior lobes; median segment short and concave, under which the larvæ shelter; the last abdominal segment forms a circular plate, with a simple hairless anal orifice in the centre. Antennæ present but short, conical, coming to a point. Legs present, first pair very short and thickened, the second and hind pair aborted, only represented by dark spots.

Maskell's galls were apparently old and much rubbed, and in his plate do not show the curious calyx, but in a co-type he sent me many years ago this is present, and there is no doubt this is his species.

357. *Cylindrococcus amplior.* Cat. Coccidæ, p. 84.

Cylindrococcus casuarinae, Maskell (Fig. 14).

Trans. New Zealand Institute, vol. xxiv, p. 41, pl. ix, figs. 1–12, 1891.
Rübsaamen, *Berl. Ent. Zeit.*, Bd. xxix, p. 218, tab. x, f. 1, 1894.
Maskell, *Ent. Monthly Magazine*, vol. xxx, p. 226, 1896.

This species is found in Victoria upon *Casuarina quadrivalvis*. I have not seen it from any part of New South Wales.

Fig. 14.—*Cylindrococcus casuarinae.*

Gall elongate, cylindrical, tapering to the apex, dull reddish brown, of a somewhat similar form to that of *C. amplior*, springing singly from the branchlets, sessile, the basal bracts very fine, with long spiny ones above, forming a calyx from which the true galls emerge; these seem to be formed of six parallel ribs coalesced together into the tubular gall, tapering to the apex, in which the apical orifice opens into the central cylindrical tube, which encloses the female. In fresh specimens the gall appears to be clothed with a grey mossy covering on the outer surface. Length variable, from one to one-quarter inch, diameter one-quarter of an inch. The adult female resembles that of *C. amplior*, but the gall is apparently a very distinct structure, though constructed in the same plan.

358. *Cylindrococcus casuarinae*. Cat. Coccidæ, p. 84.

Cylindrococcus gracilis, Fuller.

Journal West Australian Bureau Agriculture, vol. iv, p. 1346, 1897.

Trans. Ent. Soc. London, p. 451, pl. x, fig. 24, 1899.

Specimens obtained upon twigs of *Casuarina humilis*, near Perth, West Australia. In his first reference he says: "A species which may perhapt be regarded as a variety of *C. spiniferous*." In the second, Fuller says thas "the galls are much more slender and the imbricate bracts do not project so much. Length, one to one and a quarter inches, diameter one-fifth of an inch."

359. *Cylindrococcus gracilis*. Cat. Coccidæ, p. 84.

Cylindrococcus spiniferus, Maskell (Fig. 15).

Trans. New Zealand Institute, vol. xxiv, p. 43, pl. x, figs. 1–7, 1891.

Froggatt, *Agri. Gazette N.S.W.*, vol. ix, p. 498, 1898.

This is the commonest gall upon the different species of Casuarinas growing in the coastal districts of New South Wales, Victoria, and South Australia. The type was taken on *C. quadrivulvis*.

Gall very variable in size and shape, often covering the branchlets with their cone-shaped structures; others on the tips of the slender branchlets very fine and elongate. One specimen that I have springs directly from the apex of a young seed cone.

General form rugose, oval at base, tapering to the tip, composed of a number of stout, thickset, reddish brown, leaf-like bracts; the basal portion consisting of six or more often stout angulated bracts, which sometimes

turn outward, forming a regular star when viewed from beneath: in many others the basal row of bracts turn upward and form a regular calyx round the base of the next ring of seven or eight spined bracts; above this is a second row of similar bracts, above which, tapering to the apex, are the elongated tips of all the internal slender tubular sections of the gall, in the

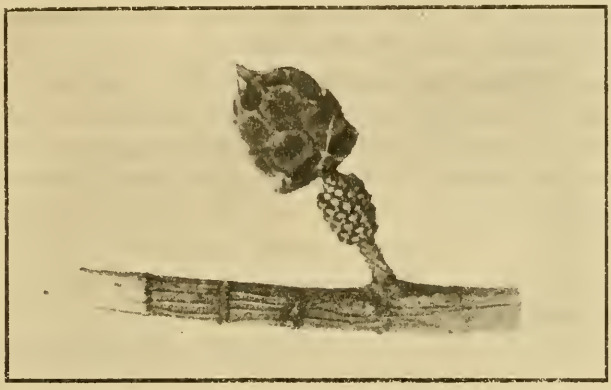

Fig. 15.—*Cylindrococcus spiniferus.*

centre of which is the cylindrical tube containing the female coccid. All these bracts can be removed one by one, until the central tubular one is reached containing the female coccid.

Adult female so similar in general form and structure to that of *C. amplior* that Maskell states that it would be difficult to separate them on the female coccid. In one of the plates of Scott's "Australian Lipidoptera and their Transformations," the artist has depicted a spray of *Casuarina* bearing these galls, evidently under the impression they were the true seed capsules of the sheoak.

360. *Cylindrococcus spiniferus.* Cat. Coccidæ, p. 84.

Genus LII. *Ourococcus*, Fuller.

Trans. Ent. Soc., London, p. 452, 1899.

This genus was formed for three West Australian coccids, living in crevices in the bark of trees and producing a single long glassy tail from between the pair of anal tubercles. Abdomen tapering to the extremity; antennæ aborted, rudimentary; legs aborted or absent.

The species are described from West Australia; Cockerell, in his paper in the *Canadian Naturalist*, entitled the "Determination of the Genera of Coccidae," 1899, proposes to place these insects in his group *Conchaspinae*, coming after *Callipappus*, but in Mrs. Fernald's catalogue they are placed after the *Sphaerococcus*.

Ourococcus cobbi, Fuller.

Journal Bureau Agriculture, West Australia, p. 1346, 1897.
Trans. Ent. Soc., London, p. 453, 1899.

Adult female found on crevices of the bark of an undetermined species of *Eucalyptus*. Abdomen rounded, furnished with long glassy tail; West Australia.

385. *Ourococcus cobbi*. Cat. Coccidæ, p. 88.

Ourococcus eucalypti, Fuller.

Journal Bureau Agriculture, West Australia, p. 1346, 1897.
Trans. Ent. Soc., London, p. 452, 1899.

Adult female with similar habits and food plant to *O. cobbi*, producing a long glassy tail, but with the abdomen tapering to the extremity and terminating in two incurved points; West Australia.

386. *Ourococcus eucalypti*. Cat. Coccidæ, p. 88.

Ourococcus casuarinæ, Fuller.

Journal Bureau Agriculture, West Australia, p. 1346, 1897.
Trans. Ent. Soc., London, p. 453, 1899.

The adult female in the bracts of the *Casuarina* branchlets; forming similar tails, but the tip of the abdomen tapering, and ending in two strong tubercules.

384. *Ourococcus casuarinae*. Cat. Coccidae, p. 88.

Genus LIII. *Olliffia*, Fuller.

Trans. Ent. Soc., London, p. 442, 1899.
Cockerell, *Science*, vol. iv, No. 88, p. 299, 1896.

"The adult female is stationary, with somewhat conspicuous anal tubercules, apparently like those of an *Eriococcus*, but it differs in having a chitinosed prolongation of the dorsal arc of the anal opening between them; antennæ seven-jointed, atrophied; legs atrophied or absent" (Fuller).

Olliffia eucalypti, Fuller.

Trans. Ent. Soc., London, p. 442, pl. xx, fig. 10, 1899.

The elongate adult female hidden beneath bark scales and covered with fumagine. Abdomen with two blunt spined tubercules, between which is the anal ring, surrounded with six stout hairs; dorsal arc produced into a chitinous conical point; rostrum large; mentum three-jointed; epidermis with compound spinnerets; length, 0·04 inch.

Found on *Eucalyptus* sp., at Perth, West Australia.

362. *Olliffia eucalypti*. Cat. Coccidæ, p. 85.

SUB-FAMILY VI. —*Tachardinae.*

The coccids comprised in this division are the lac-producing insects of commerce, of which *Tachardia* (*Coccus*) *laci* is the type. The females secrete a quantity of wax-like secretion, commonly known as lac, enveloping the naked fleshy coccids in a more or less regularly formed structure. The male test is small and shaped like a lady's slipper. The female coccid is furnished with an anal ring with numerous bristles; she is an irregularly rounded fleshy creature, with a pair of tubular appendages on the dorsal surface, once known as lac tubes, but now considered to be breathing tubes.

This is a group small in number of species, but well represented in Australia by several fine species.

Genus LIV. *Tachardia*, Blanchard.

Zoologie Medicale, vol. 1, p. 3, 1886.

Signoret, 1876. Maskell, 1897.

The typical form of this genus is the lac insect *Coccus lacca*, described by Kerr in 1782. In 1874, Signoret formed the genus *Carteria* for the lac-forming coccids, and was followed by Maskell and other writers: but finding afterwards that the name had been previously used for a group of crustaceans, he discarded it, and reverted to Blanchard's later name. The adult females are enclosed in a more or less regular shaped mass of waxy resinous secretion, sometimes bubble-shaped, pointed, rounded and ribbed, or simply an irregular mass. The test of the male coccid, on the other hand, is usually in all the species shaped like a slipper, and formed of a similar waxy resin. The female coccid is an irregular wrinkled reddish rounded creature, with a pair of lac tubes standing out on either side of the ventral surface, which Green considers are air tubes, the tip of the abdomen usually forming a kind of peg.

Some twenty-four species have been described, six of which are peculiar to Australia; the others from the southern parts of North America, Mexico, West Indies, Brazil, Africa, and India.

Tachardia acaciæ, Maskell.

Trans. New Zealand Institute, vol. xxiv, p. 56, 1891.

Targioni, *Cont. l'etude Gom. laques*, p. 121, 1893.

This species was obtained by the collectors on the Elder Exploring Expedition in Central Australia upon an undetermined species of *Acacia*: "The female coccids," Maskell says, "excreting a quant ty of light red or pinkish resinous matter, aggregated in masses or in detached irregular pieces." The female of the usual globular form, but the extremity much less hairy and the tubes much shorter than in *T. melaleucae*, with the tip of the abdomen divided, bearing two spines.

607. *Tachardia acacia*. Cat. Coccidæ, p. 123.

Tachardia angulata, Froggatt (Fig. 16).

Pro. Linnean Society, N.S.W., vol. xxxvi, p. 154, 1911.

This remarkable species has only been found in two localities down the south coast of New South Wales, at Eden and Milton. In both cases upon quince trees, in neglected orchards. The waxy secretion of

the adult female forming the test is dark red to black in colour, broad at the base and coming up to blunt point at the apex, like a large rose thorn; viewed from above it is seen to be fluted, with four distinct ridges. The outer surface is smooth, with fine white filaments curling through the openings in the test. Height of test, a quarter of an inch. Diameter base, one-fifth of an inch.

The adult female is bright red, apex shining, anal appendages and tubes tipped with black, anal tip projecting, fringed with fine bristle-like hairs, with fine spine above. Diameter, one-sixth of an inch.

Fig. 16.—*Tachardia angulata.*

Tachardia australis, Froggatt (Ffg. 17).

Agric. Gazette, N.S.W., vol. x, p. 1161, 1899.

This lac insect was first collected by me upon the branchlets of a small native scrub shrub (*Bergeria riscosa*), near Narrabri, N.S.W. Later on I found it in large quantities on the young wood of *Melaleuca* sp., growing near Bundaberg, Queensland.

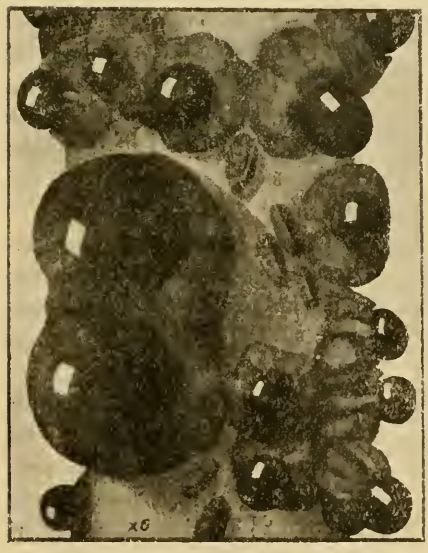

Fig. 17. *Tachardia australis.*

It is figured in the plate of lac-producing coccids with the original description, and from a commercial point of view, might be of some value if cultivated in our ti-tree swamps.

The female tests vary considerably, the typical ones like a leaf of dark reddish wax, the basal half dull with the upper portion a shining round bead of bright red wax. In the Queensland specimens the wax is more confluent, forming masses in rings round the twigs

without any very regular structure. Female bright red, smooth, shining. Length, 1½ lines. Of the usual turbinate form, with the cephalic fold falling over in front, and rounded like some of the *Brachyscelid* coccids. Dorsal surface smooth, anal extremity short and broad, terminating with a ring of fan-shaped hairs.

610. *Tachardia australis*. Cat. Coccidæ, p. 123.

Tachardia convexa, Fuller.

Trans. Entom. Soc., London, p. 457, 1899.

This species comes from Western Australia, where Fuller found it upon a species of *Hypocalymma*. The test is dark brown, very convex, smooth, with two lateral filaments protruding from circular orifices. Length, 0·15 inch. Adult female elongate, thoracic tubes well developed, chitinous ring at apex of abdomen, with ten hairs; dorsal spine distinct, with several hairs. Anterior spiracles large, surrounded with small pores.

611. *Tachardia convexa*. Cat. Coccidæ, p. 123.

Tachardia decorella, Maskell (Fig. 18).

Trans. New Zealand Institute, vol. xxv, p. 247, 1892, and vol. xxvii, p. 70, 1894.
" " " vol. xxviii, p. 408, 1896.
Barlow, *Indian Museum Notes*, vol. iv, p. 58, 1896, pl. v.
Froggatt, *Agric. Gazette, N.S.W.*, vol. x, p. 1162, pl. o, 1899.

This, a very typical Australian form, with a very wide range from South Australia to Queensland, and is found upon a number of different native shrubs and trees in New South Wales, such as *Monotoca elliptica*, *Eugenia smithi*, *Myrica cerifera*, &c., about the vicinity of Sydney, and on the west upon the desert cypress (*Frenella robusta*). In Queensland it has been recorded upon orchard trees.

Fig. 18.—*Tachardia decorella*.

Though considered an Australian coccid, it is rather remarkable that it has been discovered in India, infesting the tea plant and forest trees.

The covering of the adult female is remarkable for its regular form, the central portion or larval test being regularly surrounded with ridges of brownish yellow resin, forming a

circular mass, which resembles a rock-melon flattened on the summit, from one-sixth to one-eighth of an inch in diameter. When thickly encrusting the bark of the stems or twigs they often run into each other, and the shape may be altered, but they always have the same ribbed structure.

Maskell points out that this species might be easily mistaken for a *Ceroplastes*, from this regularity of form.

The enclosed adult female is dark red, of the usual globular form, with the air or lac tubes, spine and tip of abdomen fringed with fine hairs.

614. *Tachardiae decorella*. Cat. Coccidæ, p. 124.

Tachardia melaleucae, Maskell (Fig. 19).

Trans. New Zealand Institute, vol. xxiv, p. 54, 1891, and vol. xxv, p. 249, 1902.

This species was originally described by Maskell from Victoria, upon *Melaleuca uncinata*, and an undetermined species of *Eucalyptus*; was found in South Australia upon *M. pustulata* and *Astera axillaris*, while Fuller records it from Swan River, West Australia. I have found this insect upon the young twigs of *Leptopermum flavescens*, at Liverpool, New South Wales, and other places near Sydney; it evidently has a wide range over Australia. They produce a quantity of very dark red or purple resinous matter, which may be scattered about on the branchlets in some globular lumps, or running together through the quantity of female coccids, working upon the twig, forming irregular masses. On the outside of these lumps may often be noticed small quantities of white cottony fibre.

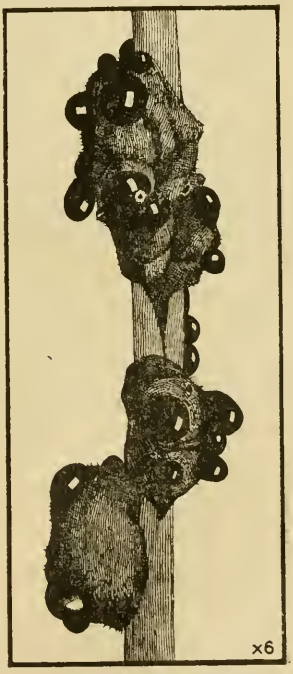

Fig. 19.—*Tachardia melaleucae*.

Maskell says that the adult female is much larger than the previous species, and that the cephalic region is covered with little patches of subcylindrical tubes, from which the white cottony fibre is produced.

621. *Tachardia melaleucae*. Cat. Coccidæ, p. 125.

SUB-FAMILY VII.—*Monophlebinae.*

The females of this group in several genera are active, and move about almost up to the last stage of their development, when they deposit their eggs and die; others are more stationary after they commence to secrete cottony matter. Some are naked, others covered with a cottony, floury or waxy secretion, some producing large quantities, form a mass of matted filaments behind the female, under which the eggs are laid, and the larvæ hatched out. They are popularly known as mealy bugs, and several belonging to the genus *Icerya* are very serious pests.

The adult female shows a distinct segmentation with the antennæ, consisting of from ten to eleven joints, and the well-developed legs are the same in the three pairs. The anogenital ring without hairs, and the tubercules simple. The males are handsome little two-winged creatures, with large facetted eyes and no ocelli. The antennæ long, clothed with fine long hairs, and the tip of the abdomen often ornamented with woolly or glassy filaments. The active larvæ have long legs, and antennæ covered with fine hairs. About sixteen species included in four genera; most of the species are peculiar to Australia.

Genus LV. *Monophlebus*, Burmeister.

Handbook of Entomology, vol. ii, p. 80, 1835.
Westwood, *Arcana Entomologica*, vol. i, p. 22, 1841.
Signoret, *Annals Soc. Ent. France* (5), p. 363, 1875.

A great deal of doubt seems to exist in the minds of all describers of the mealy bugs as to how this genus can be defined, and the latest writer, Cockerell, has contributed a paper to the "Entomologist" (vol. xxxv, p. 319, 1902), in which he seems to leave the matter in still greater confusion.

The generic name *Monophlebus* was used by Leach without defining it, and until Burmeister used it in his handbook it was only a name. Westwood then created a number of new species from the males only, but figured them in fine coloured plates. While some writers classify the species on the joints in the antennæ of the females, others define them by the anal appendages of the males.

Monophlebus crawfordi, Maskell (Fig. 20).

Trans. Royal Society, South Australia, pp. 101–108, 1888.
Trans. New Zealand Institute, vol. xxiii, pp. 28 and 48, 1891; p. 243, 1892; p. 102, 1893.
Froggatt, *Agricultural Gazette, N.S.W.*, vol. xvii, 1906, p. 770; and *Australian Insects*, 1907, p. 383, figs. 173–174.

This fine mealy bug has a very wide range along the coast from New South Wales to Perth, West Australia; the adult female usually solitary, resting on the trunk or branch of one of the small white stemmed gums, sometimes slightly hidden under the shelter of a bit of dried bark: at other times quite uncovered on the smooth stem. The adult female is of a general light brick-red tint, with dark reddish-brown legs and barred antennæ; two longitudinal stripes of dull purple extend down the whole length of the dorsal surface, and also show on the under-surface. She is broadly oval, convex on the dorsal surface, which is regularly segmented. Length, three-quarters of an inch, and broad in proportion.

The male is not unlike that of *Icerya purchasi*.

, 22. *Drosicha crawfordi*. Cat. Coccidæ, p. 19.

Monophlebus fuscus, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 224, pl. xviii, figs. 1–4, 1892.
Cockerell, *The Entomologist*, vol. xxv, p. 233, 1902, and p. 319.

The adult female of this species is brown, elongated, distinctly segmented. Length about one-fifth of an inch. The antennæ short, thick, seven-jointed, third longest, rest subequal. Cockerell forms a new genus for this species,

because the adult female has only seven joints on the antennæ, but at the same time he notes that members of the genus *Monophlebus* have eleven, nine, and seven joints. Further on he says that until the males of the different species are known they cannot be classified, and yet the male of *M. fuscus* is unknown. This small mealy bug was sent from New South Wales by Prof. Koebele, found upon Eucalyptus.

25. *Monophlebulus fuscus*. Cat. Coccidae, p. 19.

Monophlebus illigeri, Westwood.

Arcana Entomologica, vol. i, p. 22, pl. 6, f. 4, 1841.
Signoret, *Ann. Soc. Entom. France* (5), vol. v, p. 365, 1875.
Cockerell, *The Entomologist*, vol. xxxv, p. 319, 1902.

The male only of this species was described from Tasmania, and we have no record of a *Monophlebus* from Tasmania since. The rediscovery of this species would be very interesting.

The male of the usual typical form is figured with numerous short lateral abdominal processes.

6. *Monophlebus illigeri*. Cat. Coccidæ, p. 16.

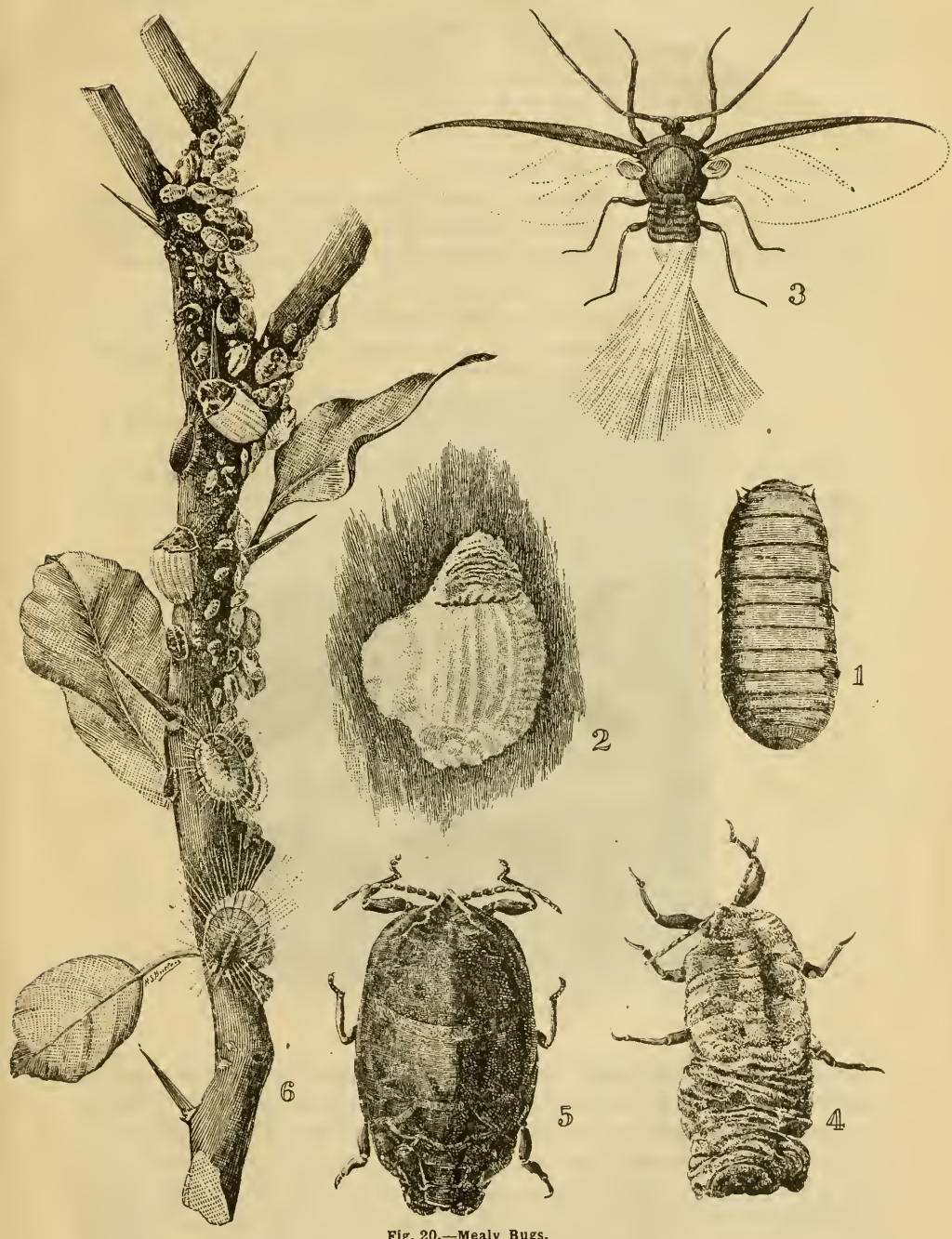

Fig. 20.—Mealy Bugs.

1. *Monophlebus crawfordi* (Female). 2. *Monophlebus crawfordi* (Female—showing Woolly Secretion). 3. *Callipappus australe* (Male). 4. *Callipappus australe* (Adult Female). 5. *Callipappus australe* (Female—after Egg-laying). 6. *Icerya purchasi* ("Cottony Cushion Scale").

Genus LVI. *Palaeococcus*, Cockerell.

Canadian Entomologist, vol. xxvi, p. 36, 1894.
Entomologist, vol. xxxv, p. 233, 1902.

This genus includes species that were previously described in other different genera such as *Icerya* and *Monophlebus*.

Cockerell defines it as follows: "Female soft, convex, without an ovisac; genital aperture large, considerably anterior to the end of the body; antennæ with from nine to eleven joints. Male without caudal fleshy appendages."

Palaeococcus australis, Maskell (Fig. 21).

Icerya rosae var. *Australis*, *Trans. New Zealand Institute*, vol. xxvi, p. 101 1893, and vol. xxviii, p. 406, 1896.
Icerya australis, Cockerell, Check List, p. 323, 1896.
Palaecoccus rosae var. *Australis*, Froggatt, *Agric. Gazette, N.S.W.*, vol. xvii, p. 773, 1906.

This mealy bug was found upon *Hakea gibbosa*, growing in National Park, near Sydney, in 1893, when I then considered it a rare species, but I have since found it not uncommon on this shrub in the same locality.

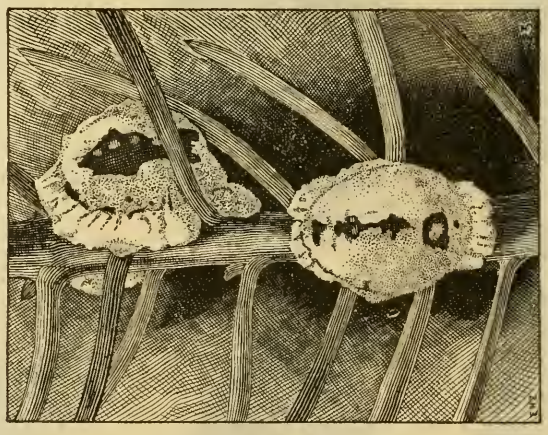

Fig. 21.—*Palaeococcus australis*.

The adult female is subglobular, convex on the upper surface, and measures about one-fifth of an inch; colour rich brown to black, with a row of yellow spots on the margin, with another row of spots midway, so that they appear to be two spots on each segment. The white cottony secretion forms a thin pad beneath the coccid, a regular fringe round the dark coloured body, and some scattered particles over it, but no true ovisac. The larvæ are of the cottony cushion scale type, red and flattish, with six-jointed antennæ, and the insects are attached to the main branchlets.

When Maskell described this mealy bug he considered it a variety of Riley and Howard's *Icerya rosae*, described from Florida, U.S.A., upon quite a number of trees and shrubs besides the rose, but Cockerell raised it to the rank of a distinct species.

30. *Palaeococcus australis.* Cat. Coccidæ, p. 21.

Palaeococcus nudatus, Maskell (Fig. 22).

Icerya nudata, Trans. New Zealand Institute, xxviii, p. 405.

This mealy bug was found by Olliff in the gardens about Sydney, upon the roots of cosmos, verbena, and other plants, and when sending the specimens to Maskell he stated "that the insects were said to be doing very considerable injury."

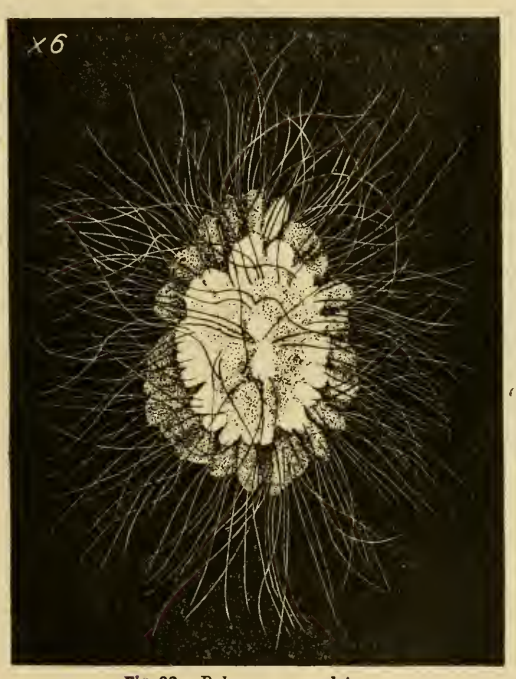

Fig. 22.—*Palaeococcus nudatus.*

I have never found this mealy bug as a pest in the Sydney gardens, but found it thickly infesting the foliage of a patch of red clover growing at our experiment farm at Wollongbar, near Lismore, though it did not seem to be doing any noticeable damage to the crop.

The adult female is yellowish red on the front half, with abdominal portion darker red, but the whole surface is so thickly powdered over with mealy secretion that it appears to be snow white; it is a swollen convex insect

with a distinct lateral ridge dividing the upper half from the ventral portion. It measures about one-fifth of an inch in length, and one-seventh of an inch in height.

27. *Palaeococcus nudatus*. Cat. Coccidae, p. 32.

Palaeococcus dymocki, n.sp.

This fine species was collected by Miss M. Dymock upon the basal stems above the roots of a small undetermined shrubby plant at Spring Valley (near Hughenden, North Queensland).

Adult female light biscuit brown or buff coloured, very lightly covered with mealy secretion, chiefly on the margins and under-surface; broadly convex, rounded on dorsal surface, narrowest in front, very slightly ribbed, broadly rounded behind. Under-surface of head and thorax corrugated, the abdominal portion flattened and slightly flanged on the margin. Length, one quarter of an inch. Antennæ black fringed, with fine hairs, composed of eight segments, first three fusiform, fourth and fifth rounded, sixth and seventh smaller and constricted on either side, eighth as long as the three last combined, elongate, and sometimes appearing to be composed of two fusiformed segments. Legs black, long, with fine spines along the inner margin of femora and tibiæ, digitules fine hairs, tarsus long and curved. Epidermis covered with scattered short hairs and minute orifices.

Larvæ red, clothed with long fine hairs, forming a fringe of three on either side of the anal segment, all over the body and on either side of the antennæ. Lightly covered with white meal, probably from the secretion on the underside of the mother. Antennæ, eyes, mentum and legs black; antennæ very long, composed of six segments, the last as long as the previous three, swollen and round at the extremity.

Genus LVII. *Icerya*, Signoret.

Ann. Soc. Entom. France, vol. v, p. 390, 1875.
Comstock, *Report Dep. Agr. U.S.*, 1880, p. 547.
Maskell, *Coccidae of New Zealand*, 1887, p. 104.

The members of this genus are well known mealy bugs, on account of the widespread damage one species (*Icerya purchasi*) did in the American orange orchards.

The adult females have long, eleven-jointed antennæ, the whole or part of the insect clothed with fine mealy secretion or cotton, stationary, with or without an ovisac; segments of abdomen hardly defined. Rostrum and mentum present. Adult males with remarkable dilated antennæ, without tassels on the abdomen.

Icerya aegyptiacae, Douglas.

(*Crossotosoma.*) *Entomologists' Monthly Magazine*, vol. xxvi, p. 79, 1890, and *Kew Bulletin*, No. 41, 1890.
Riley and Howard, *Insect Life*, vol. ii, p. 256, ; vol. iii, pp. 97–105, and 423; vol. vii, pp. 51–271.
Newstead, *Ent. Monthly Magazine*, vol. xxix, p. 167, 1893, and vol. xxxiii, p. 60, 1894.
Maskell, *Trans. New Zealand Institute*, vol. xxv, p. 99, 1893.

The discovery of this coccid in several different parts of the world within a few years makes it very doubtful where it originally came from, though it was first found in Egypt (where it was a serious pest in the gardens of Cairo and Alexandria), and has since been called the "Egyptian Icerya." It was found in North America, Madras, India, Ceylon, and Australia; in the latter country by me, upon a small native plant, *Goodenia ovata*, at Penshurst, near Sydney.

The adult female measures a quarter of an inch, and is more flattened, resting on the leaf, with the cottony filaments not forming a fluted mass behind the anal portion, as in *Icerya purchasi*, but spreading round the margins in curved and curled strands.

48. *Icerya ægyptiaca*. Cat. Coccidæ, p. 24.

Icerya koebelei, Maskell.

Entomologists' Monthly Magazine, vol. xxviii, p. 184, 1892.
Trans. New Zealand Institute, vol. xv, p. 245, pl. xviii, figs. 5–11, 1892.

This species was sent by Prof. Koebele, who found odd specimens upon *Leptospermum laevigatum*, both near Sydney, New South Wales, and Brisbane, Queensland.

I have them in the same manner on the same shrub about Sydney, but it is, comparatively speaking, a rare species.

It has the same fluted cotton on the hind portion of the body as *I. purchasi*, but differs in being smaller; " of a bright red colour, but covered with dots and patches of cottony meal, which are often so thick as to hide the body and make the insect appear to the naked eye quite white. Length of insect one-tenth of an inch. The dorsal pencil, the ten-jointed antennæ and the very small ovisac of the adult female " (Maskell). One of the most noticeable and constant characters is a distinct yellow tint in the cotton behind which, formed like that of *I. purchasi*, makes the adult female considerably longer than Maskell defines it.

53. *Icerya koebelei*. Cat. Coccidæ, p. 24.

Icerya hyperici, Froggatt (Fig. 23).

Agric. Gazette, N.S.W., vol. xxx, p. 472, 1919.

The young female is of a reddish yellow colour, clothed on the dorsal surface with a pale yellow flocculent secretion, forming fluffy patches round the outer margin and irregular tufts all over the back, interspersed with fine scattered hairs. From the anal extremity projects a hair-like filament of white secretion, up to a quarter of an inch in length. Length of coccid, one twenty-fourth of an inch.

The adult female varies in colour from a light orange yellow to a brick red, but thickly covered with white mealy secretion, forming a marginal fringe of woolly tufts and an irregular ridge of similar matter down the centre of the back. Antennæ and legs black. Length, slightly over one-sixth of an inch.

In general form this species is broadly oval, rounded on the dorsal surface, with a well-defined marginal fold running round from the insertion of the fore legs to the anal segment, ventral surface flattened. Both the dorsal and ventral surfaces are clothed with fine scattered hairs, longest on the sides and anal segment. The cephalic and thoracic segments are irregularly wrinkled, with the first eight abdominal segments uniform in size, the anal one rounded to the apex. The antennæ are composed of ten joints, basal ones broad, but of uniform length to the tenth, which is longest, oval and rounded to the extremity. Legs well developed, coxia short, thickened near the apex; femora rather short and thick set; tibia small, slender, curved and furnished with a strong curved tarsal claw.

These coccids are very active, crawling all over the lower portions of the twigs and roots. The species comes near *Icerya nudata*, Maskell, but the structure of the mealy secretion of the female, the long single anal filament of the young larvæ, and the hairs round the margins seem constant and distinct.

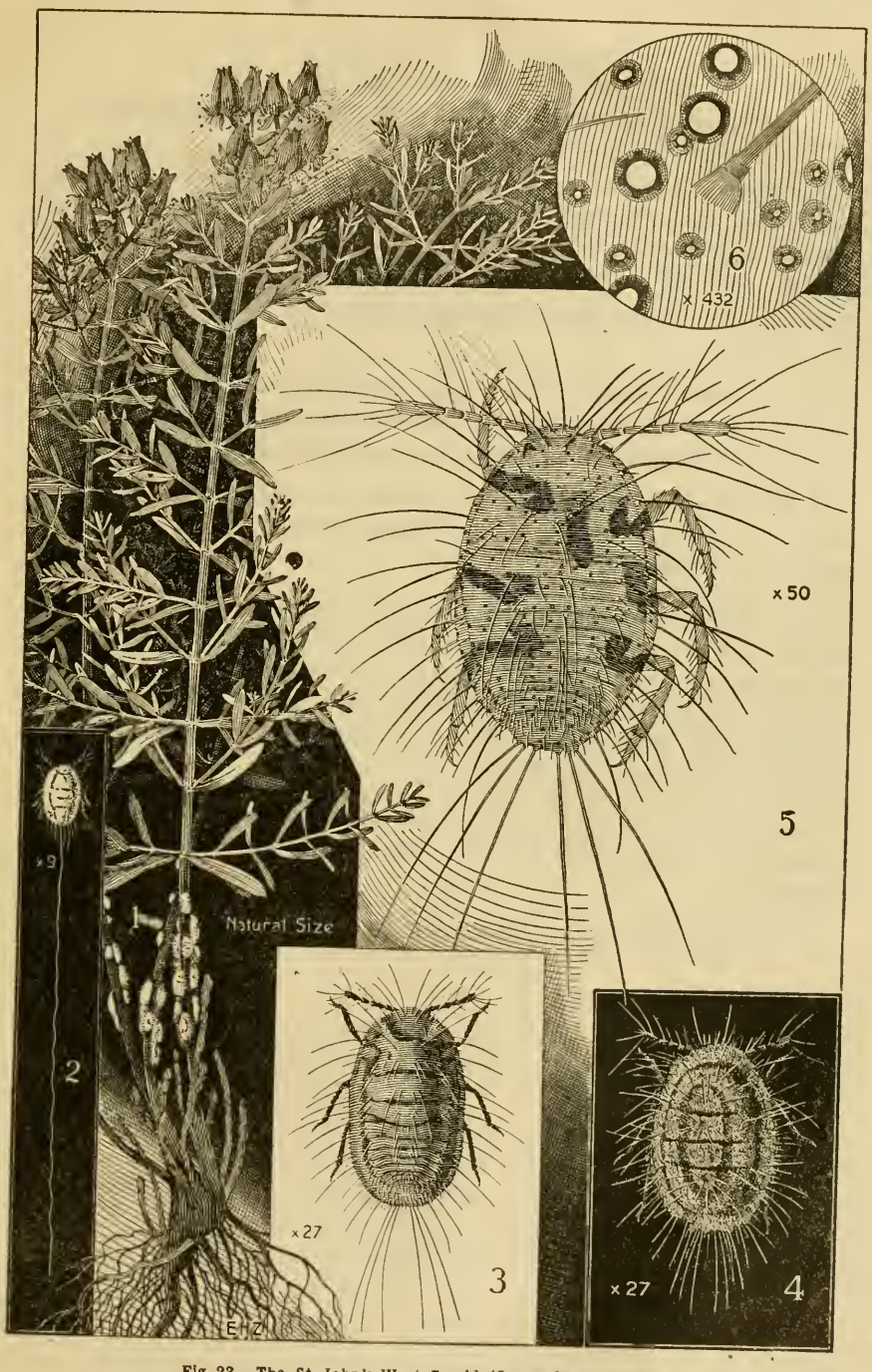

Fig. 23.—The St. John's Wart Coccid (*Icerya hyperici*, n.sp.).
1. St. John's Wort with insects attached. 2. Larva (first stage). The length of the anal filament is remarkable. 3. Larva (second stage). Woolly secretion removed. 4. Coccid, coated with woolly secretion. 5. Coccid, enlarged to show hairs and spinnerets. 6. Section of derm, magnified to show structure.

Icerya purchasi, Maskell.

Trans. New Zealand Institute, vol. xi, p. 221, 1878, and reference in 1884–6–7.
Comstock, *U.S. Dep. Agriculture*, 1880, p. 47.

This fine mealy bug has been described and figured so often that it hardly needs much notice. It was described by Maskell from specimens destroying a hedge near Auckland, New Zealand, from where it spread all over the orchards, and did an immense amount of damage; introduced into California, it there became one of the most serious pests that the citrus growers had to fight.

It is probably a native of Australia, where it is found upon wattles, and sometimes in the gardens; infests roses and creepers; occasionally it finds its way on to orange trees, but cannot be considered a citrus pest in Australia.

In Mrs. Fernald's catalogue there are about sixty references to this insect, and it is now found in South Africa, California, Florida, Fiji, Hawaii, Mexico, Portugal, and Trinidad.

The adult female coccid is dull red, with antennæ and legs black; head and thoracic portion flattened like a shield, the upper surface of the abdomen covered with a thick coat of white wool, which forms a rounded mass, extending beyond the tip of the abdomen, the whole of this wool regularly corrugated with parallel ridges, from which it takes its popular name of the Cottony Cushion, or Fluted Scale.

The male is a delicate two-winged creature of a general orange red tint, with smoky wings, and the abdomen forked at the tip, and tufted with long filaments.

59. *Icerya purchasi*. Cat. Coccidæ, p. 25.

Genus LVIII. *Callipappus*, Guérin.

Revieu de Zoologique, 1849, p. 129.
Signoret, *Annal. Soc. Entom. France* (5), vol. v, p. 347, 1875.

These mealy bugs are peculiar to Australia; six species have been described, one of which, however, is only a final dried form of another species. The females are elongate, somewhat flattened creatures, irregularly corrugated, and wrinkled upon the dorsal surface, the head and thorax somewhat angular on the sides, with long thickened antennæ formed of short, well-defined joints tapering to the extremities; the legs long, with thickened thighs, and the tarsal claw sharp and curved inwards, so that they can cling well to the hard surface of the bark. The under-surface forming two cavities under the abdomen to cover the eggs.

The males with transparent tinted wings, with thickened costal margin, short, thickset bodies, with a tuft of filaments like spun glass, often much longer than the whole of the insect.

The males can often be taken flying about in the sunlight in search of the female, the latter resting on a stump or branch a short distance above the ground. From their bright red tints and beautiful tails they are popularly called "Bird of Paradise flies."

The adult female, after she has deposited her eggs, often remains fixed to the bark of the tree trunk, on which she is resting, with the under-surface of the body attached to the bark (as if gummed), and the sharp tarsal claws fixed in the bark. The body swollen out hard and rigid, quite unlike the earlier normal form.

Callipappus australis, Maskell.

Coelostoma australis, Pro. Linn. Soc., N.S.W., p. 280, 1890, fig.
Trans. New Zealand Institute, vol. xxv, p. 242, 1892; vol. xxvii, p. 69, 1894.

The adult female coccid is of a uniform dull blue-black tint, covered with scattered white flakes, and short cottony secretion at the tip of the abdomen. Elongate, rounded at the extremities, slightly convex on the dorsal surface, distinctly segmented. Length up to one inch. Antennæ eleven-jointed, equal in length, lightly clothed with hairs.

The male is a very beautiful little dull red creature with bluish wings, purple to red at the base, with the nervures red, with the tip of the abdomen furnished with a tuft of beautiful filaments like spun glass, forming a fan-shaped tail, so that it is a remarkable looking little creature flying round in the sun in search of the resting female.

This coccid is common in New South Wales and Queensland.

79. *Callipappus australis*. Cat. Coccidæ, p. 31.

Callipappus farinosus, Fuller.

Journal of the Bureau Agriculture, West Australia, vol. iv, No. 17, 1897, p. 1346.
Trans. Ent. Soc., London, p. 437, 1899.

This was described from specimens found under the dead bark on a sheoak (*Casuarina*). Length, one inch, of a general claret brown colour, viewed from above, elongate, ovate, clothed with fine mealy flakes, with ten-jointed antennæ, the thoracic segments marked with transverse red bands.

A second species, described by Fuller, under the name of *C. bufo*, on a number of different trees, is only the final, or moribund stage, of either *C. farinosa* or *C. westwoodi*. I have often taken them attached to the bark by the ventral surface, just as they are figured in " Australian Insects."

81. *Callipappus farinosus*. Cat. Coccidæ, p. 31.

Callipappus immanis, Maskell.

Coelostoma immane, Trans. New Zealand Institute, vol. xxvi, p. 49, 1891; vol. xxv, p. 241, p. 214, 1892; and vol. xxvii, p. 69, 1894.
Tepper, *Trans. Royal Society, South Australia*, vol. xxiii, p. 278, 1899.

This species comes from Central Australia, where it was taken upon *Acacia aneura*. Maskell described the female as varying from reddish brown to almost black, and from one-third to an inch in length. Tepper obtained a fine series from Port Augusta, South Australia, some of which measured one and a half inches in length, and were dusted all over with white meal-like dust.

The males have the typical blue black bodies and rose-coloured wings.

82. *Callipappus immanis*. Cat. Coccidæ, p. 31.

Callipappus rubiginosus, Maskell.

Trans. New Zealand Institute, vol. xxv, p. 242,1892.

It is found in Victoria and South Australia on the leaves of the honeysuckle (*Banksia integrifolia*). Maskell describes it as a dark reddish-brown mealy bug, covered with short slender filaments, giving it a rusty tint. The body is irregularly wrinkled, with a ridge running round the outer margin.

83. *Callipappus rubiginosus*. Cat. Coccidæ, p. 32.

Callipappus westwoodi, Guérin.

Revieu Zoologique, xii, p. 129, 1841.
Signoret, *Ann. Soc. Ent. France* (5), vol. v, p. 375, 1875.
Fuller, *Journal Bureau of Agriculture, W.A.*, vol. iv, No. 17, p. 1346, 1897.
,, *Trans. Ent. Soc., London*, p. 437, 1899.

This typical species of the genus was described by Guerin upon eucalypts from West Australia. Redescribed by Signoret in 1875, and recorded as common about Perth, West Australia, by Fuller, who says : " Adult females purple, flattish; secreting long glassy filaments. Length, one inch." Guerin, who probably described his type from dead, dried specimens, says the female is about half an inch in length, brownish black, covered all over with a fine silky, yellow pubescence. Males, which Mr. Lea sent me, are of the usual reddish colour, with the antennæ very long and slender, and the abdominal tail of silken glassy filaments, very long and brush-like.

84. *Callipappus westwoodi*. Cat. Coccidæ, p. 32.

Genus LIX. *Newsteadia*, Green.

Entomologists' Monthly Magazine, vol. xxxviii, 1902, p. 284.

This genus was created by Green when examining material sent to him by Mr. French from Victoria; while identifying the specimens as the European coccid *Orthezia floccosa*, he said that this species differed from all other members of the genus, the tibio-tarsal articulation being absent in all the legs, and the terminal joint of the antennæ apparently composed of two fused joints, forming a scape-like termination, the antennæ thus consisting of seven joints instead of eight, and also having the basal joint of the antennæ very long.

Newsteadia floccosa, De Geer.

Coccus floccosus, *Mem. Ins.*, vii, p. 604, 1778.
,, Douglas, *Ent. Monthly Magazine*, xvii, pp. 174–204, 1881: and
,, *Trans. Ent. Soc., London*, p. 447, 1881, and p. 300, Pro. ix, 1881.

This is a European mealy bug that has been described under several different names. In 1901 Mr. French sent Mr. Green some coccids found "on some wet timber at the 300-feet level, in a mine in Gippsland, Victoria." On examination, Green found this coccid was the well-known European mealy bug, *Orthezia floccosa*. It is doubtful if it is a native of Australia, and has been introduced into the mine in some accidental manner.

It is a typical species of a genus, the members of which in general appearance all resemble each other. The adult females being partly or wholly covered with plates of secretion, and furnished with antennæ of eight or nine joints, usually the latter. It is usually found among grass and moss in England.

108. *Newsteadia floccosa*. Cat. Coccidæ, p. 39.

Sydney: William Applegate Gullick, Government Printer—1921.

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